

# इंटरनेट

# मानक

## Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 4570-1 (1983): Crystal Unit Holders, Part 1: General Requirements and Tests [LITD 5: Semiconductor and Other Electronic Components and Devices]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



BLANK PAGE



IS : 4570 ( Part 1 ) - 1983

*Indian Standard*  
SPECIFICATION FOR  
CRYSTAL UNIT HOLDERS

PART 1 GENERAL REQUIREMENTS AND TESTS

*( First Revision )*

---

First Reprint FEBRUARY 1989

UDC 621.373.5:621.316.58

© Copyright 1983

BUREAU OF INDIAN STANDARDS  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

# Indian Standard

## SPECIFICATION FOR CRYSTAL UNIT HOLDERS

### PART 1 GENERAL REQUIREMENTS AND TESTS

### ( First Revision )

Piezoelectric Devices for Frequency Control and Selection  
Sectional Committee, LTDC 12

#### Chairman

SHRI S. KUMAR

#### Representing

Bharat Electronics Ltd, Bangalore

#### Members

SHRI M. PRABHAKARAN ( Alternate to Shri S. Kumar )	
SHRI J. K. BHATTACHARYA	Directorate General of Civil Aviation, New Delhi
SHRI S. C. GHOSH ( Alternate )	
DR V. N. BINDAL	National Physical Laboratory ( CSIR ), New Delhi
DR ASHOK KUMAR ( Alternate )	
SHRI R. B. D'SOUZA	Ministry of Defence, New Delhi
LT R. PRABHAT ( Alternate )	
SHRI A. N. GARUD	Bhabha Atomic Research Centre, Bombay
DR J. D. JAIN	Central Electronics Engineering Research Institute ( CSIR ), Pilani
SHRI R. S. KALE	Directorate of Coordination ( Police Wireless ), Ministry of Home Affairs, New Delhi
SHRI M. R. NATRAJ	Indian Telephone Industries Ltd, Bangalore
SHRI H. S. ANANTHANARA- YANA RAO ( Alternate )	
DR C. S. R. RAO	Directorate General of All India Radio, New Delhi
DR P. SAHA	Central Glass Ceramic Research Institute ( CSIR ), Calcutta
SHRI ANNAMALAI ( Alternate )	
SHRI M. SANKARALINGAM	Directorate General of Supplies & Disposals ( Inspection Wing ), New Delhi
SHRI R. V. NARAYANAN ( Alternate )	

( Continued on page 2 )

© Copyright 1983

BUREAU OF INDIAN STANDARDS

This publication is protected under the Indian Copyright Act ( XIV of 1957 ) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

## IS : 4570 ( Part 1 ) - 1983

( Continued from page 1 )

### *Members*

SHRI A. SHAHUL HAMEED

SHRI K. P. N. KUTTY ( Alternate )

SHRI NARENDRA SHAEMA

SHRI J. S. BAWA ( Alternate )

SHRI R. C. JAIN,

Head ( Electronics )

### *Representing*

Kerala State Electronics Development Corporation  
Ltd, Cannanore

Posts & Telegraphs Board, New Delhi

Director General, ISI ( *Ex-officio Member* )

### *Secretary*

SHRI B. K. SHARMA

Assistant Director ( Electronics ), ISI

# *Indian Standard*

## SPECIFICATION FOR CRYSTAL UNIT HOLDERS

### PART 1 GENERAL REQUIREMENTS AND TESTS

### *( First Revision )*

#### 0. FOREWORD

**0.1** This Indian Standard ( Part 1 ) ( First Revision ) was adopted by the Indian Standards Institution on 18 February 1983, after the draft finalized by the Piezoelectric Devices for Frequency Control and Selection Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

**0.2** The dimensions, performance requirements and tests for judging the electrical, mechanical and climatic properties of crystal unit holders intended for use in electronic and telecommunication equipment are covered by IS : 4570-1968\* and are based on IEC Publication 122-3 (1962). It has been decided to revise IS : 4570-1968\* to bring it in line with the latest IEC Pub 122-3 ( 1977 ) in regard to the performance requirements, test methods, types and dimensions of such holders. The Committee responsible for the preparation of this standard has also decided to prepare the revision in a series of standards consisting of a number of parts; Part I covering the general requirements and tests for judging the electrical, mechanical and climatic properties of crystal unit holders. The specific and detailed requirements of different types of crystal unit holders would be covered in subsequent parts. IS : 4570-1968\* would be withdrawn when all the standards in the revised series are published.

**0.3** This standard describes test methods on crystal unit holders and specify uniform requirements for judging the electrical, mechanical and climatic properties of these crystal unit holders used in electronic and telecommunication equipment.

**0.4** While preparing this standard, assistance has been derived from IEC Publication 122-3 ( 1977 ) 'Quartz crystal units for frequency control and selection, Part 3 : Standard outlines and pin connectors' issued by the International Electrotechnical Commission ( IEC ).

---

\*Specification for crystal holders.

**0.5** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

---

## **1. SCOPE**

**1.1** This standard ( Part 1 ) ( First Revision ) covers general requirements and tests for judging the electrical, mechanical and climatic properties of crystal unit holders intended for use in electronic equipment.

**1.2** A crystal unit holder includes a cover, a base or other means of closure and suitably insulated pins, terminals or leads. It does not include the mounting springs.

## **2. TERMINOLOGY**

**2.0** For the purpose of this standard, the following definitions shall apply in addition to those covered by IS : 1885 ( Part 44 )-1978†.

**2.1 Base** — A support to mount the crystal element by means of pins which may also provide electrical connections from crystal electrodes to the external circuits.

**2.2 Routine Tests** — Tests carried out on each crystal unit holder to check requirements which are likely to vary during production.

**2.3 Type Tests** — Tests carried out to prove conformity with the requirements of this standard. These are intended to prove the general qualities and design of a given type of crystal unit holders.

**2.4 Acceptance Tests** — Tests carried out on samples selected from a lot for the purposes of verifying the acceptability of the lot.

**2.4.1 Lot** — All the crystal unit holders of the same type, category and rating manufactured by the same factory during the same period.

## **3. TYPE DESIGNATION**

**3.1** The types of crystal unit holders shall be as specified in Table 1.

\*Rules for rounding off numerical values ( revised ).

†Electrochemical vocabulary: Part 44 Piezoelectric devices.



**TABLE 1 TYPES OF CRYSTAL UNIT HOLDERS**

( Clause 3.1 )

SL No.	DESCRIPTION	HOLDER TYPE
( 1 )	( 2 )	( 3 )
i)	Two pin crystal unit outline	AA AB
ii)	Tube type crystal unit outline with seven pins	AP AR AS AT AU
iii)	Two wire crystal unit outline	BC BC/1
iv)	Two wire crystal unit outline	BF BF/1 BG BG/1
v)	Two pin crystal unit outline	CX
vi)	Microminiature two wire crystal unit outline	DJ
vii)	Three wire crystal unit outline	DK
viii)	Two pin crystal unit outline	DN
ix)	Two wire crystal unit outline	DP
x)	Two pin crystal unit outline	DQ
xi)	Microminiature two wire crystal unit outline	EB

**3.2** The type designation used shall be as given in the following example to identify a particular type of crystal unit holder ( *see also 3.1* ).

*Example:*

Two pin crystal unit holder Type AA

**3.2.1** The type designation of a particular crystal unit holder shall be specified in the relevant specification.

## 4. DIMENSIONS

**4.1** The crystal unit holder outlines, their dimensions and the details of the associated gauges shall be specified individually in subsequent parts.

## 5. MATERIALS, CONSTRUCTION AND WORKMANSHIP

**5.1 Materials** — The crystal unit holders shall be constructed from suitable materials preferably conforming to the relevant Indian Standard, if any.

**5.1.1** Solder if used shall conform to IS : 193-1977\*.

**5.1.2** Rosin and alcohol soldering fluxes are preferred. Other fluxes may be used with prior agreement regarding the flux, process of application and method of removing residues, between the purchaser and the manufacturer.

**5.2 Construction** — Crystal unit holders shall be so constructed as to conform to the dimensions specified in the relevant specification.

**5.2.1 Covers and Bases** — Covers and bases shall be so constructed as to permit easy assembly and interchangeability of covers and bases of the same type ( supplied on any one contract or order ).

**5.2.2 Glass Seals** — Glass seals shall be secured and shall contain no radial or detrimental cracks.

NOTE 1 — Cracks mentioned in Appendix A shall not be constructed as radial or detrimental cracks.

NOTE 2 — For checking conformity with this requirement, glass seal shall be examined under 10 times magnification and a strong light.

**5.3 Workmanship** — All parts of crystal unit holders shall be manufactured and processed in a careful and workmanlike manner in accordance with the good engineering practice.

## 6. MARKING

**6.1** Only the carton containing the crystal unit holders shall be marked with the following information:

- a) Name and trade-mark of the manufacturer, and
- b) Type of holder.

---

\*Specification for soft solder ( *third revision* ).

**6.1.1** The carton of the crystal unit holders may also be marked with the ISI Certification Mark.

**NOTE** -- The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution ( Certification Marks ) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

## 7. TESTS

### 7.1 General Conditions for Tests

**7.1.1 General** — The test shall be carried out on the crystal unit holders as received from the manufacturer or the supplier. In no case shall the contact parts be cleaned or otherwise prepared prior to the tests unless explicitly so agreed.

**7.1.2 Selection of Samples** — The samples shall be so selected as to be representative of each category and type of the crystal unit holders.

**7.1.3 Atmospheric Conditions for Testing** — Unless otherwise specified, all tests shall be carried out under the standard atmospheric conditions specified in IS : 589-1961\*.

**7.1.4 Preconditioning** — Before measurements are made, the crystal unit holders shall be stored at the measuring temperature for a time sufficient to allow the entire crystal unit holders to reach the temperature. The recovery period called for after conditioning is adequate for this purpose.

**7.1.5 Correction to be Applied** — When measurements are made at an ambient temperature other than the reference temperature, the results shall, where necessary, be corrected to the reference temperature. The ambient temperature during the test shall be stated in the test report.

**7.1.6 Precautions** — During measurements, the holders shall not be exposed to draughts, direct sun-rays or other influences likely to cause errors.

---

\*Basic climatic and mechanical durability tests for components for electronic and electrical equipment ( revised )

## 7.2 Classification of Tests

**7.2.1 Type Tests** — The procedure for type approval shall be in accordance with IS : 2612-1965\*.

- a) *Number of samples* — Unless otherwise specified, the number of samples shall be 30 for each category pertaining to the relevant type of crystal holders.
- b) *Selection of samples* — The samples shall be representative of the range of crystal unit holders for which approval is sought.
- c) *Schedule of type tests* — The crystal unit holders shall be subjected to the tests according to Table 2 and in the order as given.

---

**TABLE 2 SCHEDULE OF TYPE TEST**

TEST ( 1 )	NUMBER OF SAMPLES ( 2 )	CLAUSE REF ( 3 )
<i>Group 0</i>		
General examination	30	7.3.1
Dimensions		7.3.2
Voltage proof		7.4.2
Insulation resistance		7.4.1
<i>Group 1</i>		
Robustness of termination	10	7.5.1
Soldering		7.5.2
Composite temperature/humidity cyclic		7.6.1
Rapid change of temperature		7.6.2
Salt mist		7.6.3
Hermetic sealing		7.6.5
<i>Group 2</i>		
Leakage	10	7.6
Thermal shock		7.7
<i>Group 3</i>		
Mould growth	10	7.6.4

---

\*Recommendation for type approval and sampling procedures for electronic components.

**7.2.2 Routine Tests** — The following tests shall be carried out in the order stated:

- a) General examination ( see 7.3.1 ),
- b) Voltage proof ( see 7.4.2 ), and
- c) Insulation resistance ( see 7.4.1 ).

**7.2.2.1** If during routine tests more than 10 percent of the lot fails, the entire lot may be rejected.

**7.2.3 Acceptance Tests** — The acceptance tests shall be carried out on a limited number of samples selected in accordance with the sampling procedure given in IS : 2612-1965\*, and which have passed the routine tests. Two groups of samples, one for non-destructive test ( Group A ) and the other for destructive tests ( Group B ) shall be selected ( see Appendix B of IS : 2612-1965\* ). The acceptance tests and failure criterion shall be as given in Table 3.

**TABLE 3 SCHEDULE OF ACCEPTANCE TESTS**

TEST	CLAUSE REF	+AQL ( PER- CENT DEFECTIVE )	INSPECTION* LEVEL	D/N†
( 1 )	( 2 )	( 3 )	( 4 )	( 5 )
Group A ( Non-Destructive )				
a) Leakage	7.6	1	II	D
b) Robustness of terminations	7.5.3			
Group B ( Destructive )				
a) Hermetic sealing	7.6.5	4	S-3	N
b) Thermal shock	7.8			
c) Salt mist	7.6.3			
d) Soldering ( applicable to crystal unit holders with wire leads )	7.5.2			

\*Sampling plans and procedures for inspection by attributes for electronic items ( under preparation ).

†D = Destructive; N = Non-destructive

\*Recommendation for type approval and sampling procedures for electronic components.

### **7.3 General Tests**

**7.3.1 Visual Examination** — The crystal unit holders shall be visually examined for the construction, workmanship, finish and assembly ( see 5 ). The numbering of contact if any, shall be correct. There shall be no deterioration in the finish specified after electrical, mechanical and climatic tests.

**7.3.2 Dimensions** — The dimensions of the crystal unit holders shall be checked with respect to its overall dimensions, proper seating and interchangeability. These shall be in accordance with those specified in 4.1.

**7.3.2.1 Pin alignment** — For checking the pin alignment of the holders test gauges as specified or a shadowgraph shall be used. The pins in the base of the holder shall freely enter the pin alignment test gauge until the base assembly is firmly seated on the gauge or the pin alignment shall conform to the maximum dimensional tolerances of the pin alignment test gauge as viewed through a shadowgraph.

### **7.4 Electrical Tests**

**7.4.1 Insulation Resistance** — The insulation resistance shall be measured with a direct voltage of  $100 \pm 15$  V applied between:

- a) Terminations; and
- b) Terminations connected together and metal parts of the case, if any.

The insulation resistance shall be not less than 1 000 M ohms.

**7.4.2 Voltage Proof** — The crystal unit holder shall withstand without breakdown or flashover the application of a dc voltage of 1 000 V applied between the parts specified in 7.4.1. The test voltage shall be raised at a rate not exceeding 500 V per second and shall be maintained at the maximum value for a period of one minute.

### **7.5 Mechanical Tests**

#### **7.5.1 Robustness of Terminations**

**7.5.1.1 Tensile test** — This test shall be carried out on the base assembly in accordance with 7.19.1 of IS : 589-1961\* with a force 20 N, the load being applied along its axis for a period of 30 seconds.

After the test, there shall be no evidence of damage. There shall be no evidence of the glass seal loosening from the pins of base.

---

\*Basic climatic and mechanical durability tests for components for electronic and electrical equipment ( revised ).

**7.5.1.2 Bending test on wire and tag terminations** — This test shall be carried out in accordance with **7.19.2** of IS : 589-1961\*. The load required and the number of bends for wire and tag terminations shall be 0.5 kg and two bends in the same direction, respectively.

There shall be no visible damage to the crystal unit holder after this test.

**7.5.1.3 Bending test on pin terminations** — The body of the crystal unit holders shall be clamped and the pins loaded in turn, consecutively in opposite directions perpendicular to the pin axis with a force 2.5 N, for a period of 10 seconds in each direction. The force shall be applied as near to the free end of the pin as possible and in no case be near to the free end of the pin as possible and in no case be more than one fourth of the pin length down the free end. The force shall be applied gradually.

After the test, there shall be no visible damage to the crystal unit holders.

**7.5.2 Soldering** — This test is applicable to crystal unit holders with wire lead terminations. This test shall be carried out in accordance with **7.18.2** of IS : 589-1961\*. The terminations shall then be thoroughly cleaned of flux and its surface shall be examined using 10 times magnification to determine.

- a) that the termination is covered by a continuous new solder coating to 95 percent of the area of the surface of the terminations, and
- b) that pin-holes or voids are not concentrated in any single area and do not exceed 5 percent of the total area.

## **7.6 Composite Temperature/Humidity Cyclic**

**7.6.1** The crystal unit holders shall be tested in accordance with composite temperature/humidity cyclic test given in IS : 9000 ( Part 6 )-1978†. After recovery, the crystal unit holders shall be visually examined. There shall be no evidence of glass seal loosening from the pins of the base or any other visible damage to the crystal unit holders. The insulation resistance shall be measured in accordance with **7.4.1**.

---

\*Basic climatic and mechanical durability tests for components for electronic and electrical equipment ( revised ).

†Basic environmental testing procedures for electronic and electrical items: Part 6 Composite temperature/humidity cyclic test.

**7.6.2 Rapid Change of Temperature** — This test shall be carried out in accordance with **7.14** of IS : 589-1961\*. The maximum and minimum temperature shall be appropriate to the category of the crystal unit holders. The total number of cycles shall be five. The period of exposure to both maximum and minimum temperature shall be one hour each. After the exposure, the crystal unit holders shall be removed from the chamber and allowed to recover under conditions appropriate to this test. There shall be no evidence to the glass seal loosening from the pins of base or any other visual damage to the crystal unit holders after this test.

**7.6.3 Salt Mist** — The crystal unit holders shall be subjected to this test in accordance with **7.10** of IS : 589-1961\*, the period of exposure being four days. After the expiry of the test, the crystal unit holders shall be removed from the chamber. It shall be visually examined for any damage and legibility of marking. There shall be no sign of corrosion.

**7.6.4 Mould Growth** — The crystal unit holders shall be subjected to the mould growth test in accordance with **7.9** of IS : 589-1961\*. After the expiry of the specified period of exposure, there shall be no mould growth on the crystal unit holders visible to the naked eye.

**7.6.5 Hermetic Sealing (for Sealed Units Only)** — For this test, sealed crystal unit holders shall be assembled from the individual base and cover units. The base and/or individual bell assembly, as applicable, shall be tested in accordance with Test C of **7.16.3** of IS : 589-1961\*. After the test, the assembly shall be examined for evidence of mechanical damage and the insulation resistance shall be measured between pins and other external metal parts of the holder.

The base or end bell assembly shall show no mechanical damage and there shall be no change in the insulation resistance value from those specified in **7.4.1**.

## **7.7 Leakage**

**7.7.1 Base** — The base of the crystal unit holder shall be clamped to a suitable jig and subjected to a gauge pressure of 3.5 kg/cm, while immersed in water for at least 30 seconds. The base shall show no evidence of leakage around the pins, at the seams, or through cracks or porous spots in the base of the material. A series of bubbles emanating from the interior of the base shall be considered as evidence of leakage.

---

\*Basic climatic and mechanical durability tests for components for electronic and electrical equipment ( revised ).



**7.7.2 Cover** — The cover shall be clamped to a suitable test jig and the cavity shall be subjected to a gauge pressure of 3.5 kg/cm, while immersed in water for at least 30 seconds. The cover shall show no evidence of leakage. A series of bubbles emanating from the interior of the cover shall be considered as evidence of leakage.

## 7.8 Thermal Shock

**7.8.1 Base** — The base shall be immersed for at least 30 seconds in a liquid flux at a temperature maintained at  $100 \pm 10^\circ\text{C}$  and then suddenly hot tin gripped for at least 10 seconds in molten solder at a temperature of  $215 \pm 10^\circ\text{C}$ . The solder shall be shaken off immediately and the base shall be cooled to the room temperature. The thermal capacity of the flux and solder baths shall be such that for the quantity of specimens being tested at any one time, the bath temperature specified above will be maintained. The insulation resistance between the pins shall then be measured in accordance with 7.4.1. The glass seal shall then be examined under 10 times magnification and a strong light, for evidence of radial or detrimental cracks.

There shall be no evidence of radial or detrimental cracks in the glass seal and there shall be no change in the value of insulation resistance from those specified in 7.4.1.

**7.8.2 Glass Envelope** — The glass envelope shall be immersed in boiling water (  $100^\circ\text{C}$  ) for  $15 \pm 1$  seconds and immediately thereafter shall be immersed in ice water (  $0^\circ\text{C}$  ) for  $5 \pm 1$  seconds. The volume of water shall be large enough so that the temperature of water shall not be appreciably affected by this test.

The glass envelope shall not crack or break during this test.

## APPENDIX A

( Clause 5.2.2 )

### ACCEPTANCE CRACKS FOR CRYSTAL UNIT HOLDERS

#### A-1. ACCEPTANCE CRACKS FOR CRYSTAL UNIT HOLDERS TYPE AA, AB OR BC

**A-1.1** Cracks which originate at the edge of the glass seal and terminate at the edge of the glass seal shall not be construed as radial or detrimental, provided that no portion of the crack is more than 1 mm from the internal edge of the base, as shown in Fig. 1. Cavities from clipping, pits or bubbles, smaller in diameter than one-third the minimum distance between the pin and base, shall not be construed as radial or detrimental cracks.

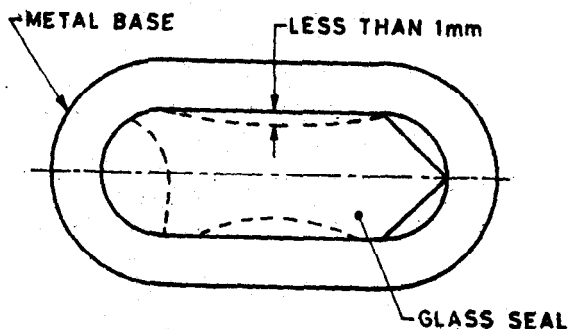


FIG. 1 CRACK IN CRYSTAL UNIT HOLDER TYPES AA, AB OR BC